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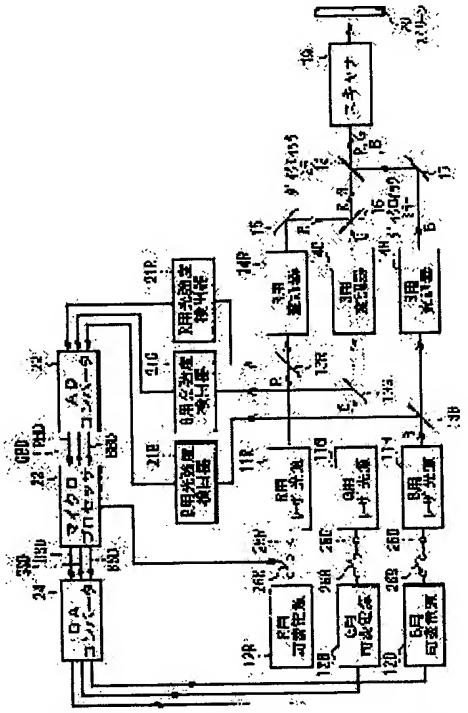
(54) LIGHT SOURCE CONTROL DEVICE, ITS METHOD AND LIGHT SOURCE SYSTEM, PROJECTION DISPLAY DEVICE AND ITS LIGHT SOURCE MANAGEMENT SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To properly deal with abnormality in the event of its occurrence in a light source.

SOLUTION: Each chromatic light from a plurality of laser light sources 11R, 11G, 11B is detected with a light intensity detector 21R, 21G, 21B. On the basis of the detection result, a microprocessor 23 discriminates the presence of abnormality for each of the laser light sources 11R, 11G, 11B. In the case a light source with abnormality is found, the microprocessor 23 controls the light sources by stopping the operation of at least one light source including the abnormal light source.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The light source control unit for controlling two or more light sources which generate different colored light characterized by providing the following A detection means to detect each optical output value of two or more aforementioned light sources Control means which perform control which stops operation of at least one light source containing the unusual light source when there is the light source with which it judges whether abnormalities are accepted about each of two or more aforementioned light sources based on the detection result of the aforementioned detection means, and abnormalities are accepted
[Claim 2] The aforementioned control means are light source control units according to claim 1 characterized by stopping operation of all the light sources when there is at least one light source with which abnormalities are accepted.

[Claim 3] Furthermore, the light source control unit according to claim 1 characterized by having a notice means to notify that when there is the light source with which abnormalities are accepted.
[Claim 4] The light source control unit of the claim 3 publication characterized by having the means of communications for notifying the purport abnormalities are accepted to be to a remote place as the aforementioned notice means.
[Claim 5] It is the light source control method for controlling two or more light sources which generate different colored light. Detect each optical output value of two or more aforementioned light sources, and it is based on this detection result. The light source control method characterized by performing control which stops operation of at least one light source containing the unusual light source when there is the light source with which it judges whether abnormalities are accepted about each of two or more aforementioned light sources, and abnormalities are accepted.
[Claim 6] The light source system characterized by constituting so that only other light equipment may be made to perform optical output operation when light equipment with the need of stopping operation of the light source more unusually arises, while having two or more light equipment characterized by providing the following and making optical output operation perform using two or more aforementioned light equipment of all in a normal state Two or more light sources which generate different colored light A detection means to detect each optical output value of two or more aforementioned light sources Control means which perform control which stops all operation of two or more aforementioned light sources when there is the light source with which it judges whether abnormalities are accepted about each of two or more aforementioned light sources based on the detection result of the aforementioned detection means, and abnormalities are accepted
[Claim 7] Projected type display characterized by providing the following. Two or more light sources which generate different colored light A detection means to detect each optical output value of two or more aforementioned light sources Control means which perform control which stops operation of at least one light source containing the unusual light source when there is the light source with which it judges whether abnormalities are accepted about each of two or more aforementioned light sources based on the detection result of the aforementioned detection means, and abnormalities are accepted A modulation means to modulate each colored light from two or more aforementioned light sources controlled by the aforementioned control means, and a projection means to project the modulation light by the aforementioned modulation means as an image light
[Claim 8] It has two or more light equipment which has the light source, the aforementioned detection means, and the aforementioned control means of the aforementioned plurality. While being the projected type display made as [compound / by one / finally / each colored light from each aforementioned light equipment] and making optical output operation perform using two or more aforementioned light equipment of all in a normal state Projected type display according to claim 7 characterized by constituting so that only other light equipment may be made to perform optical output operation when light equipment with the need of stopping operation of the light source more unusually

arises.

[Claim 9] The light source managerial system equipped with the management tool which carries out unitary management of each light source system of two or more projected type display which is characterized by providing the following, and which has a light source system, respectively, and two or more aforementioned projected type display through a communication network, and the means of communications which notifies the information on each light source system of two or more aforementioned projected type display to the aforementioned management tool through the aforementioned communication network The aforementioned light source systems are two or more light sources which generate different colored light. A detection means to detect each optical output value of two or more aforementioned light sources Control means which perform control which stops all operation of two or more aforementioned light sources when there is the light source with which it judges whether abnormalities are accepted about each of two or more aforementioned light sources based on the detection result of the aforementioned detection means, and abnormalities are accepted

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[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the light source system which equipped the light source control unit for controlling two or more light sources and the method, and the row with two or more equipments which have two or more light sources. Moreover, this invention relates to the light source managerial system for managing the light source used for the projected type display which displays an image using the light from two or more light sources, and two or more projected type display.
[0002]
[Description of the Prior Art] There is projected type display (projector) which displayed the image by carrying out intensity modulation of the light from the light source using an optical modulator, and conventionally, projecting the modulation light on a screen. There are a front projection method (front formula) which projects an image from the front-face side of a screen, and a tooth-back projection method (rear formula) which projects an image from a tooth-back side as projection method in a projector. As an optical modulator, a liquid crystal panel (LCD;Liquid Crystal Display) or DMD (Digital Micromirror Device) is used, for example.
[0003] In the projector for color displays, for example, intensity modulation of each colored light of red (R), green (G), and blue (B) is carried out by the optical modulator, respectively, each of those colored light is compounded, and a color image is generated. In this case, in the light source, each colored light is generated using the white light sources, such as a metal halide lamp, by carrying out color separation of the white light with a dichroic mirror etc.
[0004] On the other hand, there is also a method using not the white light source but the monochrome luminescence type light source which generates each colored light two or more as the light source. For example, the technology about the projector which performs graphic display to USP5,317,348 and USP5,253,073 using two or more laser light sources which generate each colored light of R, G, and B, and two or more modulation elements for [each] the colors of R, G, and B is indicated.
[0005] Drawing 9 shows the example of composition of the conventional projector using two or more laser light sources. This projector is equipped with the laser light source 101,102,103 for each colors which generates each colored light of R, G, and B, and the modulator 104,105,106 for each colors. This projector was prepared in the optical path of the green light by which outgoing radiation was carried out to the total reflection mirror 111 prepared in the optical path of the red light by which outgoing radiation was carried out from the modulator 104 for R again, and the total reflection mirror 112 prepared in the optical path of the blue glow by which outgoing radiation was carried out from the modulator 106 for B from the modulator 105 for G, and is equipped with the dichroic mirror 107,108 with the function which compounds each colored light. This projector is equipped with the scanner 109 which scans, develops two-dimensional and projects further each colored light compounded through the dichroic mirror 107,108 on a screen 110.
[0006] In this projector, red, green, and a blue laser beam are independently outputted from each laser light source 101,102,103, respectively. Intensity modulation of each colored light is carried out by the modulator 104,105,106 for each colors, respectively. Incidence of the green light by which outgoing radiation was carried out from the modulator 105 for G is first carried out to a dichroic mirror 107. It is reflected by the total reflection mirror 111 towards a dichroic mirror 107, and the red light by which outgoing radiation was carried out from the modulator 104 for R is mixed with green light there. Next, incidence of the red light and green light which were mixed is carried out to a dichroic mirror 108. On the other hand, it is reflected by the total reflection mirror 112 towards a dichroic mirror 108, and the blue glow by which outgoing radiation was carried out from the modulator 106 for B is mixed with red light and green light there. With a scanner 109, this mixed light is developed two-dimensional, and it serves as an incident light, it is projected on a screen 110, and a two-dimensional image is displayed on a screen 110.

[0007]
[Problem(s) to be Solved by the Invention] by the way -- the projector using the laser light source of plurality in this way -- at least one -- the light source -- abnormalities -- generating (an optical output declining remarkably or an output becoming zero) -- the balance of the optical output between each light source collapses, and the image projected on a screen also has the problem of becoming hard to see In the projector currently especially used for the purpose of a movie show for example, if color balance collapses greatly, the graphic display contrary to the intention of an image maker will be made, and it is not desirable. Moreover, if it continues using the abnormal light source, the situations, such as breakage of the light source, will be caused and it is not desirable.
[0008] this invention was made in view of this trouble, and the purpose is in providing the light source control unit and the light source control method of coping with it suitable for the unusual situation and a light source system, and a row with projected type display and its light source managerial system, when abnormalities occur in the light source.
[0009]
[Means for Solving the Problem] The light source control unit by this invention judges whether abnormalities are accepted about each of two or more light sources based on the detection result of a detection means to detect each optical output value of two or more light sources, and a detection means, and when there is the light source with which abnormalities are accepted, it is equipped with the control means which perform control which stops operation of at least one light source containing the unusual light source.
[0010] The light source control method by this invention detects each optical output value of two or more light sources, judges whether abnormalities are accepted about each of two or more light sources based on this detection result, and when there is the light source with which abnormalities are accepted, it is made to perform control which stops operation of at least one light source containing the unusual light source.
[0011] Two or more light sources with which the projected type display by this invention generates different colored light, It is based on the detection result of a detection means to detect each optical output value of two or more light sources, and a detection means. The control means which perform control which stops operation of at least one light source containing the unusual light source when there is the light source with which it judges whether abnormalities are accepted about each of two or more light sources, and abnormalities are accepted, It has a modulation means to modulate each colored light from two or more light sources controlled by control means, and a projection means to project the modulation light by the modulation means as an image light.
[0012] Two or more light sources with which the light source system by this invention generates different colored light, It is based on the detection result of a detection means to detect each optical output value of two or more light sources, and a detection means. When there is the light source with which it judges whether abnormalities are accepted about each of two or more light sources, and abnormalities are accepted While having two or more light equipment which has the control means which perform control which stops all operation of two or more light sources and making optical output operation perform using two or more light equipment of all in a normal state When light equipment with the need of stopping operation of the light source more unusually arises, it constitutes so that only other light equipment may be made to perform optical output operation.
[0013] The light source managerial system of the projected type display by this invention is equipped with the management tool which carries out unitary management of each light source system of two or more projected type display which has a light source system, respectively, and two or more projected type display through a communication network, and the means of communications which notifies the information on each light source system of two or more projected type display to a management tool through a communication network. And a detection means to detect each optical output value of two or more light sources with which a light source system generates different colored light, and two or more light sources, Based on the detection result of a detection means, it judges whether abnormalities are accepted about each of two or more light sources. When there is the light source with which abnormalities are accepted, while having two or more light equipment which has the control means which perform control which stops all operation of two or more light sources and making optical output operation perform using two or more light equipment of all in a normal state When light equipment with the need of stopping operation of the light source more unusually arises, it is constituted so that only other light equipment may be made to perform optical output operation.
[0014] It is judged whether with projected type display, each optical output value of two or more light sources is detected by the light source control unit by this invention and the light source control method, and the row, and abnormalities are accepted in them about each of two or more light sources based on this detection result, and when there is the light source with which abnormalities are accepted, operation of at least one light source containing the unusual light source is stopped. By operation of at least one light source containing the unusual light source being stopped, breakage of the abnormal light source etc. is prevented beforehand at least.
[0015] In the light source system by this invention, optical output operation is usually performed using two or more

light equipment of all. In each light equipment in a system, each optical output value of two or more light sources is detected, it is judged based on this detection result whether abnormalities are accepted about each of two or more light sources, and when there is the light source with which abnormalities are accepted, operation of at least one light source containing the unusual light source is stopped. When light equipment with the need of stopping operation of the light source more unusually by this arises, optical output operation is performed by only other light equipment. It is supposed that it is possible to perform graphic display succeedingly without breaking down color balance, though abnormalities arise in any one light equipment, when projected type display is constituted using this light source system.

[0016] In the light source managerial system by this invention, unitary management of each light source system of two or more projected type display is carried out through a communication network. Each light source system usually performs optical output operation using two or more light equipment of all. In each light equipment of each light source system, each optical output value of two or more light sources is detected, it is judged based on this detection result whether abnormalities are accepted about each of two or more light sources, and when there is the light source with which abnormalities are accepted, operation of at least one light source containing the unusual light source is stopped. When the light equipment which has by this the need of stopping operation of the light source more unusually, in each light source system arises, optical output operation is performed by only other light equipment. Unitary management of the performance information of such each light source system is carried out through a communication network.

[0017]

[Embodiments of the Invention] Hereafter, the gestalt of operation of this invention is explained in detail with reference to a drawing.

[0018] As shown in [gestalt of the 1st operation] drawing 1 , the projected type display concerning the gestalt of this operation The laser light sources 11R, 11G, and 11B for each colors which generate each colored light of R, G, and B, It has the sources 12R, 12G, and 12B of good transformation for each colors for driving these laser light sources 11R, 11G, and 11B, and the modulators 14R, 14G, and 14B for each colors which carry out intensity modulation of each colored light from laser light sources 11R, 11G, and 11B. this projected type display -- moreover, the total reflection mirror 15 prepared in the optical path of the red light by which outgoing radiation was carried out from modulator 14for R R, the total reflection mirror 17 prepared in the optical path of the blue glow by which outgoing radiation was carried out from modulator 14for B B, and the object for G -- it was prepared in the optical path of the green light by which outgoing radiation was carried out from modulator 14G, and has the dichroic mirrors 16 and 18 with the function which compounds each colored light This projected type display is equipped with the scanner 19 which scans, develops two-dimensional and projects further each colored light compounded through dichroic mirrors 16 and 18 on a screen 20.

[0019] The optical on-the-strength detectors 21R, 21G, and 21B for each colors in which this projected type display has further the function to detect each optical output value (optical intensity, for example, brightness) of laser light sources 11R, 11G, and 11B, It is prepared into the optical path between laser light sources 11R, 11G, and 11B and Modulators 14R, 14G, and 14B. It has the partial reflection mirrors 13R, 13G, and 13B with the function which separates spatially a part of each colored light outputted from laser light sources 11R, 11G, and 11B, and is reflected towards the optical on-the-strength detectors 21R, 21G, and 21B for each colors. This projected type display is equipped with the analog / digital (it is hereafter described as "AD".) converter 22, the microprocessor 23, and the digital one / analog (it is hereafter described as "DA".) converter 24 formed into the signal path between the optical on-the-strength detectors 21R, 21G, and 21B and the sources 12R, 12G, and 12B of good transformation again.

[0020] The sources 12R, 12G, and 12B of good transformation are connected to laser light sources 11R, 11G, and 11B through Switches 26R, 26G, and 26B and the current control terminals 25R, 25G, and 25B for current control. On-off control of the switches 26R, 26G, and 26B is carried out by the microprocessor 23. The sources 12R, 12G, and 12B of good transformation have the function which supplies the current for a drive (adjustable) to laser light sources 11R, 11G, and 11B. From the sources 12R, 12G, and 12B of good transformation, the current for a drive is supplied and laser light sources 11R, 11G, and 11B operate, when it will consist of semiconductor laser and Switches 26R, 26G, and 26B will be in an ON state. As for the sources 12R, 12G, and 12B of good transformation, the optical output value changes according to supply current.

[0021] AD converter 22 changes the detecting signal of each color from the optical on-the-strength detectors 21R, 21G, and 21B into a digital signal, and has the function outputted to a microprocessor 23. Below, the detecting signal of R, G, and B which are outputted to this microprocessor 23 is described as RBD (R Bright Data), GBD (G Bright Data), and BBD (B Bright Data), respectively.

[0022] A microprocessor 23 performs drive control of each sources 12R, 12G, and 12B of good transformation, and

has the function to adjust each optical output value of laser light sources 11R, 11G, and 11B. Based on the detecting signals RBD, GBD, and BBD from the optical on-the-strength detectors 21R, 21G, and 21B by which the AD translation was carried out, a microprocessor 23 performs a predetermined operation and outputs the control signal for optical output adjustment. Below, the control signal for optical output adjustment of R, G, and B which are outputted from this microprocessor 23 is described as RSD (R Set Data), GSD (G Set Data), and BSD (B SetData), respectively. DA converter 24 has the function which changes into an analog signal the control signals RSD, GSD, and BSD outputted from this microprocessor 23, and is outputted to each sources 12R, 12G, and 12B of good transformation. In addition, the microprocessor 23 has the internal memory for memorizing the initial value of detecting signals RBD, GBD, and BBD, the standard value of control signals RSD, GSD, and BSD, etc.

[0023] In addition, each signal value of control signals RSD, GSD, and BSD shall be in the luminous intensity (for example, brightness) and proportionality which are outputted from laser light sources 11R, 11G, and 11B.

[0024] A microprocessor 23 judges whether abnormalities are accepted about each of laser light sources 11R, 11G, and 11B so that it may mention later again, when there is the light source with which abnormalities are accepted, controls Switches 26R, 26G, and 26B, and has the function to perform control which stops operation of at least one light source containing the unusual light source. At this time, a microprocessor 23 makes a judgment whether to be unusual or not based on the detecting signals RBD, GBD, and BBD from the optical on-the-strength detectors 21R, 21G, and 21B.

[0025] In addition, in the form of this operation, the optical on-the-strength detectors 21R, 21G, and 21B correspond to one example of the "detection means" in this invention, and a microprocessor 23 corresponds to one example of the "control means" in this invention. Moreover, a scanner 19 corresponds to one example of the "projection means" in this invention. Moreover, the optical on-the-strength detectors 21R, 21G, and 21B, AD converter 22, a microprocessor 23, DA converter 24, and Switches 26R, 26G, and 26B mainly correspond to one example of the "light source control unit" of this invention among the components in the equipment of drawing 1 .

[0026] Next, operation of the projected type display of the above composition is explained.

[0027] First, fundamental graphic display operation of this projection type display is explained. In this projected type display, red, green, and a blue laser beam are independently outputted according to the supply current from the sources 12R, 12G, and 12B of good transformation, respectively from each laser light sources 11R, 11G, and 11B. The greater part of each outputted colored light penetrates the partial reflection mirrors 13R, 13G, and 13B, they carry out incidence to the modulators 14R, 14G, and 14B for each colors, respectively, and intensity modulation is carried out there.

[0028] Modulators 14R, 14G, and 14B are driven by the modulating signal from the source of a signal which was given based on the video signal and which is not illustrated. Incidence of the green light by which outgoing radiation was carried out from modulator 14G G business is first carried out to a dichroic mirror 16. It is reflected by the total reflection mirror 15 towards a dichroic mirror 16, and the red light by which outgoing radiation was carried out from modulator 14for R R is mixed with green light there. Next, incidence of the red light and green light which were mixed is carried out to a dichroic mirror 18. On the other hand, it is reflected by the total reflection mirror 17 towards a dichroic mirror 18, and the blue glow by which outgoing radiation was carried out from modulator 14for B B is mixed with red light and green light there. With a scanner 19, this mixed light is developed two-dimensional, and it serves as an incident light (image light), it is projected on a screen 20, and a two-dimensional image is displayed on a screen 20.

[0029] By the way, by the function of the partial reflection mirrors 13R, 13G, and 13B, it dissociates spatially and incidence of a part of each colored light outputted from each laser light sources 11R, 11G, and 11B is carried out to the optical on-the-strength detectors 21R, 21G, and 21B. The optical on-the-strength detectors 21R, 21G, and 21B detect the optical output value (optical intensity) of each colored light which carried out incidence. The detecting signal of each color in the optical on-the-strength detectors 21R, 21G, and 21B is changed into a digital signal by the function of AD converter 22, and the detecting signals RBD, GBD, and BBD by which the AD translation was carried out are outputted to a microprocessor 23. Based on these detecting signals RBD, GBD, and BBD, a microprocessor 23 performs drive control of each sources 12R, 12G, and 12B of good transformation, and adjusts each optical output value of laser light sources 11R, 11G, and 11B.

[0030] A microprocessor 23 judges whether abnormalities are accepted about each of laser light sources 11R, 11G, and 11B again based on detecting signals RBD, GBD, and BBD, when there is the light source with which abnormalities are accepted, controls Switches 26R, 26G, and 26B, and performs control which stops operation of at least one light source containing the unusual light source.

[0031] Next, the control action of a series of optical outputs by this microprocessor 23 is explained in detail. In this projection type display, first, for example, at the time of manufacture, each optical output value of laser light sources 11R, 11G, and 11B is adjusted at the time of factory shipments, initial adjustment of color balance (white balance) is performed (adjustment mode), and control action of an optical output is performed so that the color balance in the

initial state may be maintained after that at the time of use of actual equipment (used mode). Moreover, when abnormalities occur in the light source at the time of use of equipment, dealing with the unusual situation is performed (unusual mode).

[0032] First, with reference to drawing 2 , operation with the adjustment mode performed in early stages is explained. as for a microprocessor 23, the switches 26R, 26G, and 26B for current supply sources are turned on on altogether first -- as -- controlling (Step S10) -- the standard value of the control signals RSD, GSD, and BSD memorized by the internal memory which is not illustrated is outputted (Step S11) Each sources 12R, 12G, and 12B of good transformation supply the current for a drive to laser light sources 11R, 11G, and 11B based on the control signals RSD, GSD, and BSD of the standard given through DA converter 24. Laser light sources 11R, 11G, and 11B output the laser beam of the amount according to this supply current.

[0033] Next, by fluctuating each value of control signals RSD, GSD, and BSD, a microprocessor 23 changes the optical output value of each laser light sources 11R, 11G, and 11B, and adjusts a white balance (Step S12). Adjustment of a white balance here can be automatically performed by preparing the photosensor which is not illustrated for example, on a screen 20, and making the detection value of this photosensor feed back to a microprocessor 23. In addition, you may make it fluctuate each value of control signals RSD, GSD, and BSD manually. When a white balance is not in a still suitable state (step S13;N), a white balance is again adjusted at Step S12 until it will be in a suitable state.

[0034] On the other hand, if a white balance is settled in the range of desired and will be in a suitable state (step S13;Y), a microprocessor 23 will memorize the adjustment value of the control signals RSD, GSD, and BSD at that time to an internal memory (Step S14). Moreover, at this time, a microprocessor 23 receives the input of the detecting signals RBD, GBD, and BBD of the optical intensity of each color outputted through AD converter 22 (Step S15), and memorizes it to an internal memory by making the value into initial value (Step S16). Processing in adjustment mode is completed by the above.

[0035] Next, operation with used mode is explained with reference to drawing 3 . At first, the switches 26R, 26G, and 26B for current supply sources shall be turned on altogether. A microprocessor 23 outputs the adjustment value first memorized in Step S14 in above-mentioned adjustment mode as control signals RSD, GSD, and BSD given to each sources 12R, 12G, and 12B of good transformation through DA converter 24 (Step S71). Each sources 12R, 12G, and 12B of good transformation supply the current for a drive to laser light sources 11R, 11G, and 11B based on the control signals RSD, GSD, and BSD given through DA converter 24. Laser light sources 11R, 11G, and 11B output the laser beam of the amount according to this supply current. At this time, a microprocessor 23 receives the input of the detecting signals RBD, GBD, and BBD of each color from the optical on-the-strength detectors 21R, 21G, and 21B outputted through AD converter 22 (Step S72).

[0036] Next, a microprocessor 23 judges whether each value of the present detecting signals RBD, GBD, and BBD is more than the minimum value set up beforehand (Step S73). The set point is beforehand memorized by the internal memory of a microprocessor 23. If there are detecting signals RBD, GBD, and BBD which are less than the minimum value (step S73;N), since the optical output of the laser light sources 11R, 11G, and 11B corresponding to it will decline remarkably, a microprocessor 23 regards it as what abnormalities have generated in the light source, next performs unusual mode processing (Step S79).

[0037] There are the following two methods in unusual mode processing. Only the light source which abnormalities have generated among two or more laser light sources 11R, 11G, and 11B stops [method / 1st] operation. That is, in this case, a microprocessor 23 is controlled so that only the switch corresponding to the light source which abnormalities have generated among two or more switches 26R, 26G, and 26B becomes off. Although there is a possibility of causing the situations, such as breakage of the light source, when it continues using the abnormal light source, breakage of the light source etc. is beforehand prevented by this method. Since it continues making it operate about the normal light source, although color balance will collapse, it can express an image as this method succeedingly for the time being.

[0038] When there is at least one light source with which abnormalities are accepted as the 2nd method, operation of all the light sources is stopped. That is, in this case, a microprocessor 23 is controlled so that two or more switches 26R, 26G, and 26B are turned off off altogether. By this method, since the optical output of all the colored light of R, G, and B stops simultaneously, the display of an image is also suspended completely. In the projector currently used for the purpose of a movie show for example, this method is suitable, when avoiding that the graphic display to which color balance collapsed greatly and was contrary to the intention of an image maker is made and making it not show an image intentionally. Moreover, naturally breakage of the light source etc. is beforehand prevented also by this method.

[0039] On the other hand, if the value of all the detecting signals RBD, GBD, and BBD is more than the minimum value set up beforehand (step S73;Y), abnormalities will consider that a microprocessor 23 is what is not generated to

each laser light sources 11R, 11G, and 11B, and it will progress to the next processing. That is, next, a microprocessor 23 calculates the value of the relative value of each detecting signals RBD, GBD, and BBD equivalent to the optical output ratio of each laser light sources 11R, 11G, and 11B, for example, RBD/GBD, and BBD/GBD (Step S74). Next, a microprocessor 23 compares the calculated optical output ratio (RBD/GBD, BBD/GBD) with the optical output ratio in an initial state (Step S75). It calculates from the initial value of each detecting signals RBD, GBD, and BBD obtained at Step S16 (drawing 2) in adjustment mode, and you may make it calculate the optical output ratio in an initial state from the initial value of each detecting signals RBD, GBD, and BBD which could memorize the value to the internal memory beforehand in the stage in adjustment mode, are the running phases in used mode and were memorized in adjustment mode.

[0040] According to the result compared with the optical output ratio in an initial state, a microprocessor 23 adjusts the value of control signals RSD, GSD, and BSD so that the value of the present optical output ratio may approach the value of an initial state. Specifically, when there is an optical output ratio of a larger value than an initial state, a microprocessor 23 decreases the value of the control signal corresponding to it (Step S76). For example, if RBD/GBD is larger than the value in an initial state, the value of a control signal RSD will be decreased, and if BBD/GBD is larger than the value in an initial state, the value of a control signal BSD will be decreased. In addition, you may perform control which increases the value of GSD at this time. However, when performing control which increases a control signal, it is necessary to take care that laser light sources 11R, 11G, and 11B do not drive more than a maximum rating value.

[0041] On the other hand, when the value of RBD/GBD or BBD/GBD is smaller than the value in an initial state, a microprocessor 23 decreases the value of a control signal GSD (Step S77). In addition, you may perform control which increases the value of RSD or BSD at this time. However, it is necessary to take care that laser light sources 11R, 11G, and 11B do not drive more than a maximum rating value in this case. If the present optical output ratio is the same as the value in an initial state, the value of control signals RSD, GSD, and BSD will not be changed.

[0042] A microprocessor 23 outputs the control signals RSD, GSD, and BSD adjusted in this way through DA converter 24 to each sources 12R, 12G, and 12B of good transformation (Step S78). The drive current based on the control signals RSD, GSD, and BSD adjusted in this way is given to laser light sources 11R, 11G, and 11B. Then, a microprocessor 23 returns to Step S72 again, and repeats the adjustment of control signals RSD, GSD, and BSD based on the ratio of each detecting signals RBD, GBD, and BBD. By performing such feedback control, the ratio of each detecting signals RBD, GBD, and BBD is always kept the same as an initial state. That is, feedback control is performed and an optical output ratio is always maintained at a fixed value so that the optical output ratio of each laser light sources 11R, 11G, and 11B may always approach a fixed value. Change of a white balance with time is prevented by this, and graphic display stabilized for a long period of time is performed. In addition, although the luminosity as the whole will fall compared with an initial state when control (Steps S76 and S77 of drawing 3) which decreases the value of a control signal is performed, since the optical output ratio is controlled uniformly, color balance is kept constant.

[0043] In addition, although feedback control was performed in the processing after Step S74 of drawing 3 so that the relative value (optical output ratio) of the optical output of each laser light sources 11R, 11G, and 11B might approach an always fixed value, you may perform control which maintains not an optical output ratio but the absolute value of an optical output at a fixed value. That is, the initial value memorized at the value of the present detecting signals RBD, GBD, and BBD and Step S16 in adjustment mode is compared, and you may make it adjust the value of control signals RSD, GSD, and BSD according to the compared result, so that each value of the present detecting signals RBD, GBD, and BBD may approach initial value. In this case, not only color balance but the quantity of light can be maintained at an initial state.

[0044] In addition, control in the above used mode may working [of equipment], and always be performed, and may be performed at arbitrary time if needed. For example, when using this projection type display as equipment for the show of a movie, a use form which is performed in the intervals of the show of a movie etc. can be considered.

[0045] As explained above, according to the form of this operation, the optical on-the-strength detectors 21R, 21G, and 21B detect each colored light from two or more laser light sources 11R, 11G, and 11B. Based on the detection result, it judges whether abnormalities are accepted about each of each laser light sources 11R, 11G, and 11B. Since it was made to perform control which stops operation of at least one light source containing the unusual light source when there was the light source with which abnormalities are accepted, when abnormalities occur in the light source, it can be coped with suitable for the unusual situation.

[0046] When only the light source which abnormalities have generated especially among two or more laser light sources 11R, 11G, and 11B adopts the method of stopping operation, while breakage of the abnormal light source etc. is prevented beforehand, making it able to operate about the normal light source can be continued, and although color

balance will collapse, it can display an image succeedingly for the time being. moreover, when the method of stopping operation of all the light sources when there is at least one light source with which abnormalities are accepted especially is adopted Since the optical output of all colored light stops simultaneously and also suspends the display of an image completely For example, it avoids that the graphic display to which color balance collapsed greatly and was contrary to the intention of an image maker is made, and can avoid showing an image intentionally in the projector currently used for the purpose of a movie show.

[0047] [The gestalt of the 2nd operation], next the gestalt of operation of the 2nd of this invention are explained. In addition, in the following explanation, the same sign is given to the component shown in drawing 1 , and the portion which has the same function substantially, and explanation is omitted suitably.

[0048] With the gestalt of this operation, as shown in drawing 4 , the circuit element which performs control action of the laser light sources 11R, 11G, and 11B in the equipment shown in drawing 1 and the optical output of those will be summarized, and it will be called color balance guarantee laser light source equipment 60. The example which constitutes one projected type display from a gestalt of this operation using the light source system which has two or more sets of this color balance guarantee laser light source equipment (henceforth "color balance guarantee light equipment") 60 is explained.

[0049] Drawing 5 shows the example of the projected type display constituted using color balance guarantee light equipment 60 three sets. Moreover, although drawing 1 showed the example of composition which scans a laser beam two-dimensional with a scanner 19, and displays an image, by drawing 5 , the example which displays an image using a two-dimensional modulator is shown, without using a scanner 19. In addition, the modulation means of light and a means to project the modulation light are not limited to a specific thing by the feature portion of the form of this operation being using two or more color balance guarantee light equipment 60.

[0050] The projected type display concerning the gestalt of this operation shown in drawing 5 Two or more sets of color balance guarantee light equipment 60-1, 60-2, and the light source system 10 constituted by having 60-3, Color balance guarantee light equipment 60-1, 60-2, and the lighting optical system 71R, 71G, and 71B for each colors that has the function to expand each colored light from 60-3 two-dimensional, It has the two-dimensional modulators 72R, 72G, and 72B for [each] colors which have the function which modulates each colored light irradiated through the lighting optical system 71R, 71G, and 71B two-dimensional. As two-dimensional modulators 72R, 72G, and 72B, arbitrary things, such as LCD or DMD, can be used, for example. this projected type display -- moreover, the total reflection mirror 73 prepared in the optical path of the red light by which outgoing radiation was carried out from modulator 72for R R, the total reflection mirror 75 prepared in the optical path of the blue glow by which outgoing radiation was carried out from modulator 72for B B, and the object for G -- it was prepared in the optical path of the green light by which outgoing radiation was carried out from modulator 72G, and has the dichroic mirrors 74 and 76 with the function which compounds each colored light This projected type display is equipped with the projector lens 77 which turns and projects further each colored light compounded through dichroic mirrors 74 and 76 on a screen 20.

[0051] In this projected type display, the laser beam of R, G, and B is outputted from each of two or more color balance guarantee light equipment 60-1, 60-2, and 60-3. Each colored light outputted from R2, G2, B-2, and the 3rd color balance guarantee light equipment 60-3 in each colored light outputted from the R1, G1, B1, and 2nd color balance guarantee light equipment 60-2 in each colored light outputted from the 1st color balance guarantee light equipment 60-1 is described as R3, G3, and B3 among drawing.

[0052] For every color, incidence of the output light from two or more color balance guarantee light equipment 60-1, 60-2, and 60-3 is carried out to the lighting optical system 71R, 71G, and 71B for each colors, it is expanded to it two-dimensional, and outgoing radiation is carried out to the two-dimensional modulators 72R, 72G, and 72B for [each] colors. With the lighting optical system 71R, 71G, and 71B, each modulators 72R, 72G, and 72B become irregular two-dimensional, and carry out outgoing radiation of each colored light by which expansion lighting was carried out. After the modulation light of each color is compounded by the function of each mirrors 73-76, it is projected on it by the projector lens 77 towards a screen 20. Thereby, an image is displayed on a screen 20.

[0053] In this projected type display, all of two or more sets of color balance guarantee light equipment 60-1, 60-2, and 60-3 are performing optical output operation by the normal state. And control action (drawing 2 , drawing 3) of the optical output same about each of color balance guarantee light equipment 60-1, 60-2, and 60-3 as the form of implementation of the above 1st is performed. The 2nd above-mentioned method is adopted as the light source in the state which abnormalities generated, i.e., unusual mode processing, (Step S79 of drawing 3). That is, when there is at least one light source with which abnormalities are accepted about each of color balance guarantee light equipment 60-1, 60-2, and 60-3, operation of all the light sources in the light equipment is stopped. It is made to operate as it is about normal light equipment. Although it follows, for example, is laser-light-source 11for R R Accepted in the 1st color balance guarantee light equipment 60-1, and optical output operation of the guarantee light equipment 60-1 stops

completely by unusual mode processing when it breaks down, other two light equipment 60-2 and 60-3 perform optical output operation succeedingly, and outgoing radiation of the two laser beams is carried out about each color of R, G, and B. In this case, although the brightness as the whole falls when optical output operation of one light equipment 60-1 stops, the color balance of R, G, and B does not change. Therefore, it becomes possible to continue projection of an image without big sense of incongruity, even if one light equipment 60-1 breaks down.

[0054] As explained above, while using two or more color balance guarantee light equipment 60 equipped with two or more laser light sources 11R, 11G, and 11B according to the form of this operation Since control action of an optical output is performed about each of each light equipment, operation is stopped about the light equipment which abnormalities produced and it was made to make it operate as it is about other light equipment For example, graphic display can be performed succeedingly, without breaking down color balance, though abnormalities arise in any one light source. Thereby, it is stabilized for a long period of time, and good graphic display can be performed.

[0055] [The form of the 3rd operation], next the form of operation of the 3rd of this invention are explained. In addition, in the following explanation, the same sign is given to the component shown in drawing 1 , and the portion which has the same function substantially, and explanation is omitted suitably.

[0056] the projected type display concerning the form of this operation shown in drawing 6 -- the component of the projected type display of drawing 1 -- in addition, it has the drop 81 for performing the unusual notice of laser light sources 11R, 11G, and 11B further It connects with a microprocessor 23 and this drop 81 is controlled. When a microprocessor 23 performs unusual mode processing (Step S79 of drawing 3), while performing processing which Switches 26R, 26G, and 26B are controlled [processing], and stops operation of laser light sources 11R, 11G, and 11B, it controls by the form of this operation to display on the light source the purport which abnormalities produced in a drop 81.

[0057] In addition, as a notice means of abnormalities, it replaces with a drop 81 and a buzzer etc. may be made to perform the notice with voice. Moreover, you may make it use together the unusual notice with a drop 81 and voice.

[0058] Even if it is not seeing the image on a screen 20 when failure arises in the light source since a means to notify that was established when there was the light source with which abnormalities are accepted according to the gestalt of this operation, the failure situation can be recognized easily. For example, when performing a movie show, the maintenance personnel is not always looking at the image on a screen. According to the gestalt of this operation, even if it is such a case, a maintenance personnel can be told about abnormalities and he can be urged to perform a rehabilitation work immediately.

[0059] [The gestalt of the 4th operation], next the gestalt of operation of the 4th of this invention are explained. In addition, in the following explanation, the same sign is given to the component shown in drawing 1 and drawing 6 , and the portion which has the same function substantially, and explanation is omitted suitably.

[0060] Although a drop 81 is formed and it was made to perform the unusual notice of the light source in the projected type display of drawing 6 , the gestalt of this operation is equipped with means of communications as a notice means of abnormalities, and is made to notify abnormalities through this means of communications.

[0061] In addition to the component of the projected type display of drawing 1 , the projected type display concerning the gestalt of this operation shown in drawing 7 is equipped with the communication device 82. The communication device 82 is connected to the external communication device 83 through the communication wire 84. The drop 81 is formed in the external communication device 83. It connects with a microprocessor 23 and the communication device 82 is controlled. When a microprocessor 23 performs unusual mode processing (Step S79 of drawing 3), while performing processing which Switches 26R, 26G, and 26B are controlled [processing], and stops operation of laser light sources 11R, 11G, and 11B, it controls by the gestalt of this operation to display on the light source the purport which abnormalities produced in the external drop 81 through a communication device 82.

[0062] In addition, in the gestalt of this operation, especially the communication mode at the time of performing an unusual notice is not limited. Moreover, you may be made to communicate on radio, without using a communication wire 84.

[0063] Since that was notified through means of communications when there was the light source with which abnormalities are accepted according to the gestalt of this operation, a remote place can be told about the information that the unusual situation occurred. For example, in recent years, there is a show gestalt of the movie which enabled it to perform much movie shows in one institution and which is called cinemacomplex. In this case, a movie show is performed on many screens by many projectors. The equipment of drawing 7 can be used suitable for such a show gestalt. For example, a use gestalt which installs each projector containing a communication device 82 in an individual show room, and installs the external communication device 83 in the central surveillance room for carrying out the centralized control of each projector can be considered. By doing in this way, at a central surveillance room, a one maintenance personnel can supervise two or more projectors, and operating efficiency can be improved.

[0064] [The gestalt of the 5th operation], next the gestalt of operation of the 5th of this invention are explained. In addition, in the following explanation, the same sign is given to the component of the gestalt of each above-mentioned implementation, and the portion which has the same function substantially, and explanation is omitted suitably.
[0065] With the gestalt of this operation, while building the system using the projected type display equipped with two or more color balance guarantee light equipment 60 (drawing 4) two or more, the system which carries out unitary management of the projected type display of these plurality, especially the light source is explained. Below, the case where this managerial system is applied to movie institutions, such as a cinemacomplex which has two or more show rooms, is explained to an example.
[0066] The managerial system concerning the gestalt of this operation shown in drawing 8 is equipped with the server 94 for managing two or more projectors 90A-90D. The server 94 is installed for example, in the service company 95 which does show management of a movie. One projector 90A-90D is arranged in each projection booth different, respectively. Each projectors 90A-90D are constituted like the projected type display shown in drawing 5 using the light source system 10 which has two or more color balance guarantee light equipment 60. The communication device 91 is formed in each projectors 90A-90D.
[0067] the communication device 91 of each projectors 90A-90D -- for example, the Internet terminal capabilities, such as IEEE(Institute of Electrical and Electronics Engineers) 802.3 specification, -- having -- **** -- a hub -- it connects with the with router 92 and is constituted possible [a server 94 and communication] through the communication networks 93, such as the Internet The communication device 91 is connected to each microprocessor 23 (drawing 4) of color balance guarantee light equipment 60-1, 60-2, and 60-3 in each projectors 90A-90D. The communication device 91 has the function to collect unusual information, from each of two or more color balance guarantee light equipment 60-1, 60-2, and 60-3.
[0068] In this managerial system, in each of each projectors 90A-90D, when abnormalities occur in the light source, the same unusual mode processing as the projected type display of drawing 5 is performed. That is, for example in certain projector 90A, when abnormalities are in one color balance guarantee light equipment 60-1, optical output operation of the light equipment stops. In this case, although the luminosity of the graphic display in projector 90A is set to two thirds compared with usual, other two light equipment 60-2 and 60-3 are performing optical output operation succeedingly, and since the color balance of R, G, and B does not change, it cannot give a spectator big sense of incongruity, but can continue a show.
[0069] by the way, the information that abnormalities arose in the color balance guarantee light equipment 60-1 of certain projector 90A -- a communication device 91 -- a hub -- it is transmitted to the server 94 in the service company 95 through the with router 92 and a communication network 93 Thereby, the service company 95 can know that abnormalities have arisen in the light source of projector 90A. If the number of abnormal light equipment is one as mentioned above, since it is possible to perform the show by projector 90A that there is so no sense of incongruity, the service company 95 can fix this projector 90A out of the business hours of a movie theater. In this case, since it is not necessary to fix projector 90A in business hours, a movie theater can restore failure, without receiving economical loss.

[0070] Since the communication device 91 notified the unusual information on each light source to the server 94 in a remote place according to the gestalt of this operation while using two or more sets of color balance guarantee light equipment 60 for each light source of two or more projectors 90A-90D as explained above, in the service company 95 in the place distant from the installation of a projector, unitary management of the information that the unusual situation occurred can be carried out. Moreover, in each projectors 90A-90D, graphic display can be performed succeedingly, without breaking down color balance, though abnormalities arise in any one light source. Thereby, good graphic display by which color balance was stabilized can be performed for a long period of time.
[0071] In addition, this invention is not limited to the gestalt of each above-mentioned implementation, but various deformation implementation is possible for it. For example, this invention can be applied not only a laser light source but when using two or more of other light sources, for example, a discharge lamp, light emitting diode, an electroluminescence, etc. as the light source. Moreover, although the gestalt of each above-mentioned implementation explained the case where the three light sources, R, G, and B, were used, this invention is not limited when the light sources are three combination, R, G, and B. For example, when the white light source and the monochromatic (for example, for R) light source are combined, it can apply. Moreover, when sources of the homogeneous light other than R, G, and B are used, it can apply.
[0072] Moreover, although not illustrated, this invention is applicable also to the display which modulates a 1-dimensional laser light source, scans the modulation light with a 1-dimensional scanner like the projected type display which used GLV (Grating Light Valve), for example, and displayed the two-dimensional image on the screen.
[0073] Moreover, although the example which used three color balance guarantee light equipment 60 (drawing 4),

and constituted one projected type display was shown, two sets or the projection type display which four or more sets are used and is one may consist of drawing 5 for color balance guarantee light equipment 60.

[0074]

[Effect of the Invention] As explained above, a light source control unit or the light source control method according to claim 5 given in a claim 1 or any 1 term of 4, Or according to projected type display according to claim 7, each optical output value of two or more light sources is detected. Based on this detection result, it judges whether abnormalities are accepted about each of two or more light sources. Since it was made to perform control which stops operation of at least one light source containing the unusual light source when there was the light source with which abnormalities are accepted, when abnormalities occur in the light source, it can be coped with suitable for the unusual situation. For example, since operation of at least one light source containing the unusual light source is stopped, breakage of the abnormal light source etc. can be prevented beforehand.

[0075] Moreover, according to the light source system according to claim 6, it has two or more light equipment which has two or more light sources which generate different colored light. usually, while performing optical output operation using two or more light equipment of all, when light equipment with the need of stopping operation of the light source more unusually arises It becomes possible to perform graphic display succeedingly, without breaking down color balance, though abnormalities arise in any one light equipment, when projected type display is constituted, for example using this light source system, since only other light equipment was made to perform optical output operation. Moreover, for example, since operation of all the light sources stops in abnormal light equipment, breakage of the abnormal light source etc. can be prevented beforehand. Thus, when abnormalities occur in the light source, it can be coped with suitable for the unusual situation.

[0076] Moreover, according to the light source managerial system according to claim 9, it has two or more light equipment which has two or more light sources which generate different colored light. usually, while performing optical output operation using two or more light equipment of all, when light equipment with the need of stopping operation of the light source more unusually arises While using for each of two or more projected type display the light source system constituted so that only other light equipment might perform optical output operation Since it was made to carry out unitary management of the performance information of the light source system of each projected type display through the communication network, unitary management of the information that the unusual situation occurred in each light source system of two or more projected type display can be carried out easily in a remote place. Moreover, if there is abnormal light equipment in each projected type display for example, since operation of all the light sources in the light equipment will stop, breakage of the abnormal light source etc. can be prevented beforehand. Thus, when abnormalities occur in the light source, it can be coped with suitable for the unusual situation.

[0077] Since it was made to stop operation of all the light sources especially according to the light source control unit according to claim 2 when there was at least one light source with which abnormalities are accepted For example, since the optical output of all colored light stops simultaneously and also suspends the display of an image completely when the number of the light sources with which abnormalities are accepted when it applies to the projector currently used for the purpose of a movie show is also one It avoids that the graphic display to which color balance collapsed greatly and was contrary to the intention of an image maker is made, and can avoid showing an image intentionally.

[0078] Moreover, since it had especially a means to notify the purport abnormalities are accepted to be according to the light source control unit according to claim 3, the failure situation of the light source can be recognized easily.

[0079] Moreover, since it had especially a means to notify the purport abnormalities are accepted to be to a remote place according to the light source control unit according to claim 4, a remote place can be easily told about the information that the unusual situation occurred in the light source.

[0080] Moreover, it has two or more light equipment which has especially two or more light sources which generate different colored light according to projected type display according to claim 8. usually, while performing optical output operation using two or more light equipment of all, when light equipment with the need of stopping operation of the light source more unusually arises It becomes possible to perform graphic display succeedingly, without breaking down color balance, though abnormalities arise, for example in any one light equipment, since only other light equipment was made to perform optical output operation.

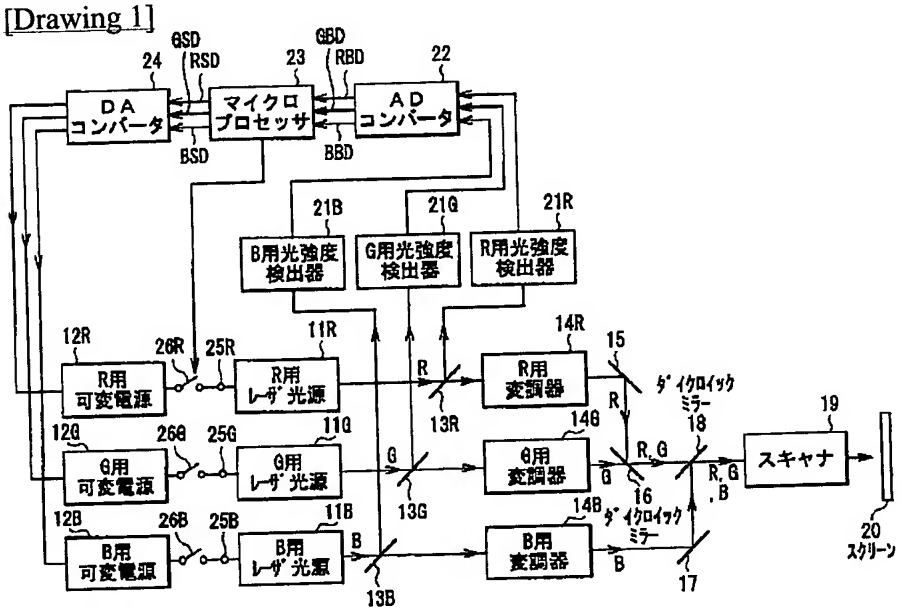
[Translation done.]

* NOTICES *

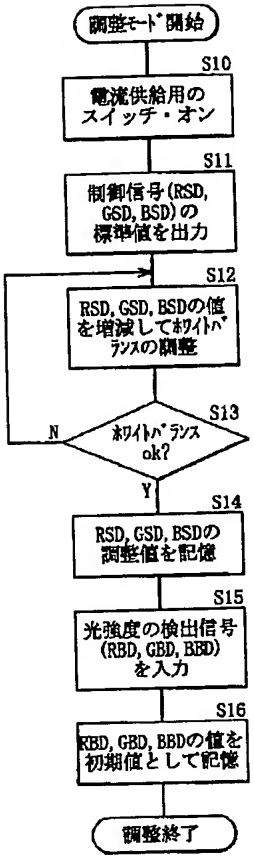
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

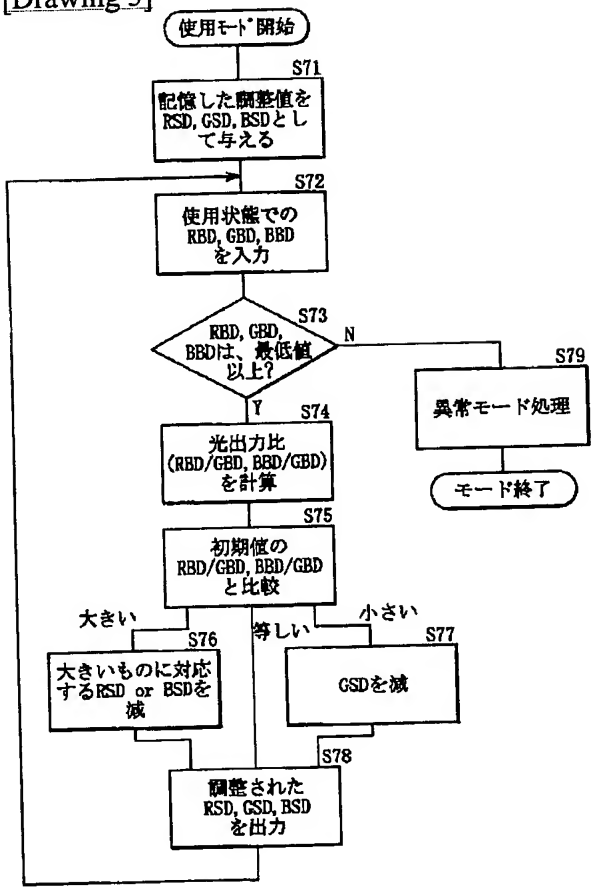
[Drawing 1]



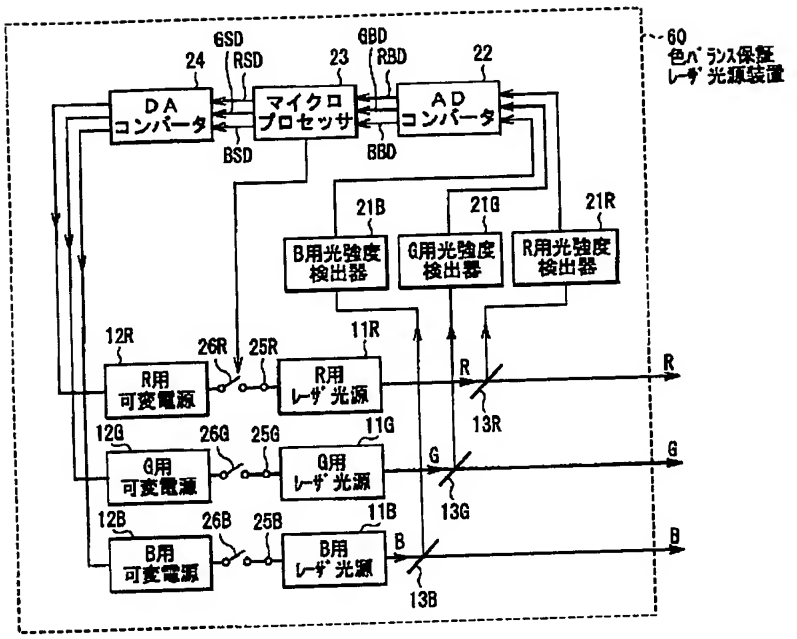
[Drawing 2]



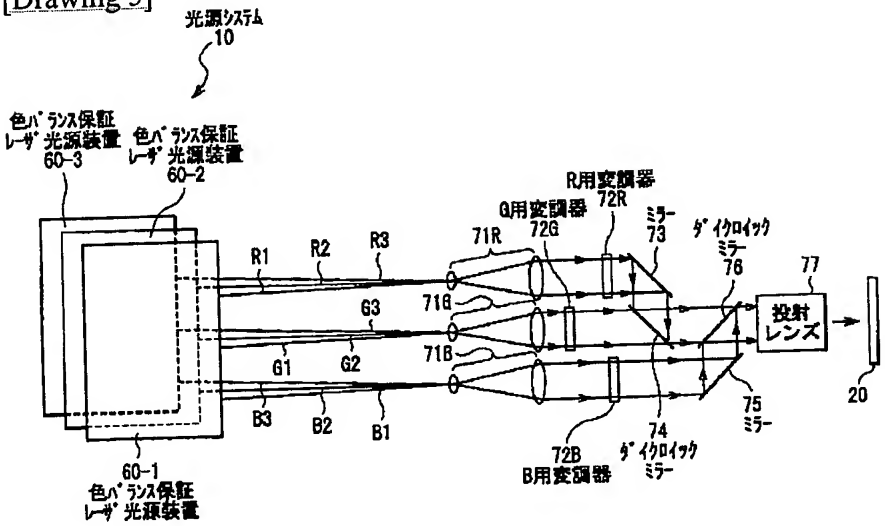
[Drawing 3]



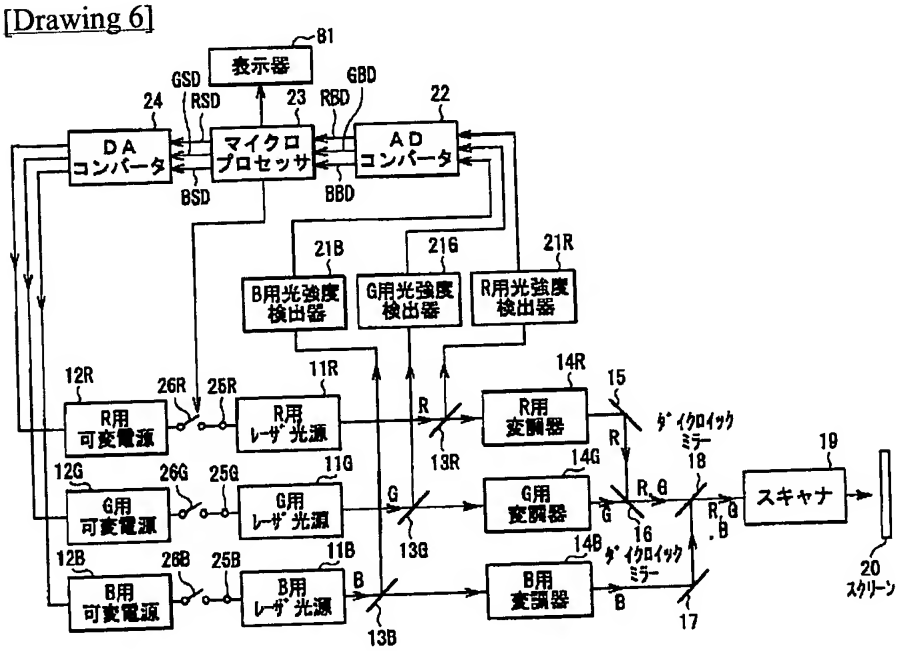
[Drawing 4]



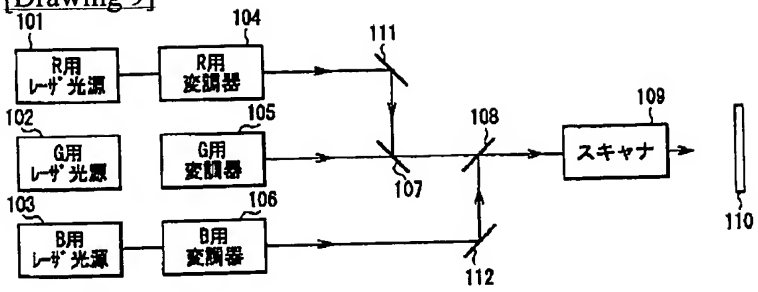
[Drawing 5]



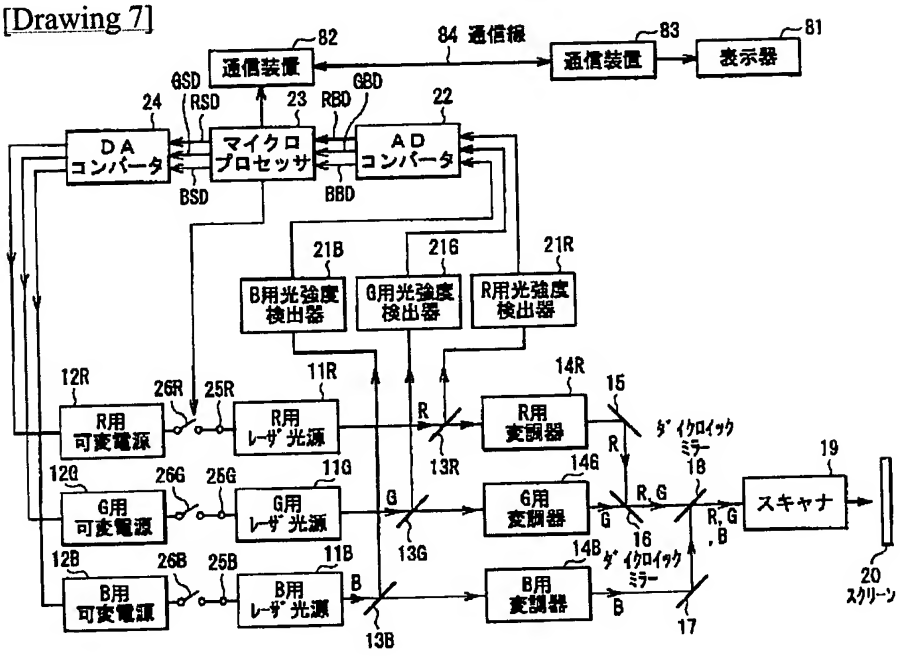
[Drawing 6]



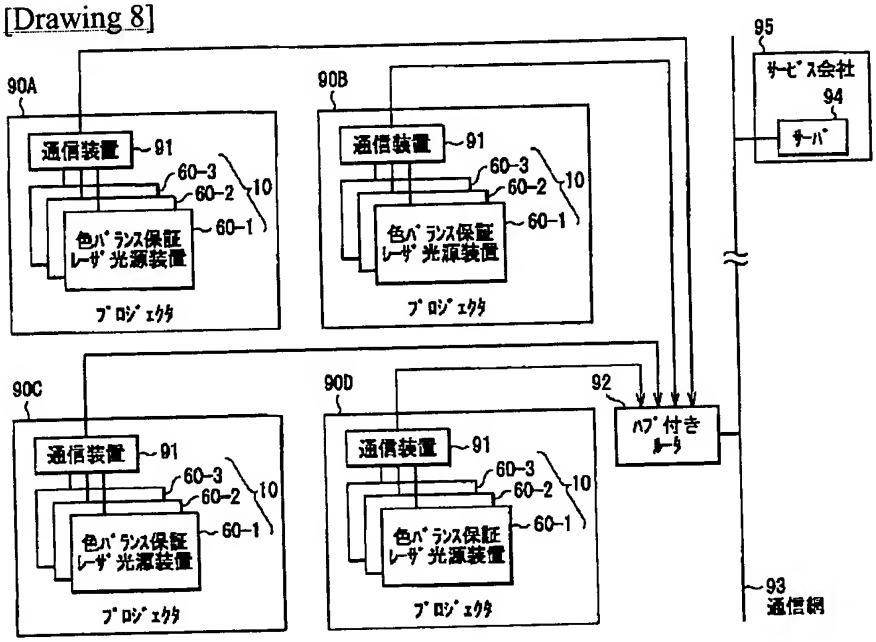
[Drawing 9]



[Drawing 7]



[Drawing 8]



[Translation done.]